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**Morphology and Diagenesis of Low Resistivity Cotton Valley Reservoirs, East Texas Salt Basin, Freestone County, Texas**

The Jurassic Cotton Valley along the western rim of the East Texas salt basin consists primarily of fine to medium-grained quartz arenites that are tightly cemented by quartz overgrowths. Porosity ranges from 6-8% and permeability ranges from 0.001-0.05 mD. The exception to this are the low resistivity sands represented by resistivity less than 4 ohms. Porosity in these sands range from 11-18% and permeability ranges from 1 to tens of mD. Traditionally, these low resistivity sands have been interpreted as wet with standard Archie Sw values in excess of 70%. Petrophysical analysis from rotary sidewall core data indicates that these low resistive zones may be productive. X-ray diffraction analysis and modal point counts of all the Cotton Valley rock types yield similar clay volumes, ranging from 2-11%. The preservation of porosity and permeability is controlled by the clay distribution; it's habit and morphology. In the low resistive zones, the clay matrix forms a continuous network of micropores and exhibits low, chemical compaction. In the high resistivity sands, the clay coatings are thin, discontinuous, often covered by quartz cement, and are chemically compacted. Clays in the low resistive sands form early in the paragenesis as grain rims, occupying the pressure-solution nucleation sites. This prevents quartz overgrowths from forming and occluding pore bodies and throats. Exploiting low resistivity zones, alone or in combination with traditional Cotton Valley sands, provides the opportunity to add additional reserves in existing wellbores and increase the drilling inventory by stacking multiple pay horizons.